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ABSTRACT

This paper discusses demographic analysis and illustrates how it might be used to strengthen educational policy planning. Much of the paper uses techniques of demographic analysis in an effort to describe the current and future demographic context of educational policy planning. The author examines trends in national fertility and age distribution and predicts sizeable fluctuations in elementary, high school, and college enrollment during the rest of this century. In addition, the author discusses several other expected demographic and social changes that will have important implications for educational policy planning. These changes include a long-term change in the labor market resulting in a teacher shortage sometime during the 1980s, an increasing trend toward mid-life career switching, and a possible decline in college attendance due to a rising incidence of families with several children of college age at the same time. (Author/JG)

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# THE DEMOGRAPHIC CONTEXT OF EDUCATIONAL POLICY PLANNING*

by

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## I. INTRODUCTION

The demand for education and society's ability to meet that demand are heavily influenced by short- and long-term trends in the growth and distribution of the nation's population. It seems obvious, therefore, that demographic analysis should form a fundamental basis upon which educational policies and plans are developed. Yet there seems to be a massive problem of ignorance and neglect: educational planning and policymaking processes are not receiving the full benefit of technical demographic analysis. Such analysis seems to have been only partly understood and ineffectively used by those who make educational policy decisions.

A prerequisite for improvement is an institutional means whereby technical demographic analysis, and the sounder basis for judgment it provides, enters the educational policy planning process in a more systematic and timely fashion. In this paper, I delineate the current and future demographic context of educational policy planning and, for certain topics, examine interactions between this context and other processes of social and economic change. By illuminating future contingencies systematically and charting what seems most probable at the time, demographic analysis can help strengthen the policymaker's design of a posture for meeting what the future may hold.

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## II. THE NATIONAL DEMOGRAPHIC CONTEXT

### FERTILITY: CURRENT TRENDS AND FUTURE OUTLOOK

Any discussion of current demographic trends must begin with the astonishing recent decline in the nation's crude birth rate. After hovering around 23 per thousand in the early 1960s, the rate fell off sharply late in the 1960s, sinking below 15 per thousand by 1974. The change caught everyone by surprise and reminded demographers that their powers of prescience are no greater today than they were after World War II when the baby boom caught the profession off guard.

That the crude birth rate failed to rise in the late 1960s was in itself remarkable. All during the early 1960s, demographers confidently forecasted a major upsurge in the birth rate. The millions of girls born during the baby boom were millions of potential mothers. Given the chronology of things (being born in the late 1940s puts you in the prime childbearing ages in the late 1960s), an "echo" of the baby boom seemed imminent.

By 1970 the experts had to take a second look, because the postwar children weren't having babies at anything like the expected rate. A puzzling anomaly appeared instead, which no one would have thought likely a few years earlier: as the number of potential mothers in the population expanded rapidly, the number of births declined absolutely. Although there were close to 900,000 *more* women of childbearing age in 1972 than in 1971, there were 300,000 *fewer* births.

Businessmen and hospital administrators recall those first painful years of the "baby bust." Baby food manufacturers began diversifying, some by marketing soft foods for the elderly, and the maternity ward became the loss leader in many hospitals throughout the country. Educational policymakers centered their immediate interest on those 300,000 fewer births, which foreshadowed declining demand for classrooms and teachers.

But demographers were left with the task of explaining *why* the birth rate had changed so suddenly and in the opposite direction from what was expected, and with trying to derive better insight into future fertility behavior.

To try to understand the *why*, it is necessary to look beyond the annual *crude birth rate* which simply relates the number of births in a year to the total population. While it is the measure of most immediate relevance to educational planners because it suggests future impacts on the schools, the crude birth rate obscures actual fertility performance. To be sure, the number of births in a given year depends on the sheer number of potential mothers in the population--especially those in the prime childbearing ages. But if that were the only determinant, the wave of baby boom children entering the reproductive ages in the later-1960s should have produced a marked rise in the crude birth rate. It did not.

The *total fertility rate* is a measure designed to eliminate the effects of age composition. It expresses the annual level of fertility as the number of children that would be born if the age-specific fertility behavior which now prevails were to constitute the schedule of age-specific fertility followed by each woman during the course of her future childbearing.* In other words, it shows how many children a woman would have if all her reproductive life she bore children according to the age-by-age rates of the particular year in question. For example, it envisions today's eighteen-year-old woman bearing children in 1985 at the same rate as twenty-eight-year-old women do today.

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*Technically, the total fertility rate is an estimate of the number of children a cohort of 1000 women would bear if they all went through their reproductive years exposed to the age-specific fertility rates in effect at a particular time. It expresses the population's annual number of births in terms of implied completed family size. In 1972, for example, the U.S. population generated 3.3 million births, which implied a total fertility rate of 2.0 children per woman.

The age-by-age fertility of any particular year, of course, is the fertility of several cohorts (i.e., generations) at different ages. These several cohorts have had different experiences and are affected differently by current events. In 1973, for example, women of reproductive age included women who had participated in the baby boom (marrying and having their families relatively young) as well as younger women who may be postponing childbearing in a time of economic and social uncertainty. Thus, the total fertility rate has the limitations of any period fertility index: it measures reproductive performance during a given *period of time* rather than for a particular *cohort of women* born at a given time and with common generational influences. See: Norman B. Ryder, "Cohort Analysis," in *International Encyclopedia of the Social Sciences*, D. E. Sills, ed. (New York: Macmillan, 1968), pp. 546-550.

But we have no assurance that the eighteen-year-olds actually will, and many indications that family-size intentions are profoundly influenced by cultural changes. Depression babies, for example, apparently overcame the influence of small family sizes in their parents' generation and yielded to the larger family expectations made stylish in the 1950s. Lacking valid explanations of *why* these expectations change, demographers are uncertain how they may change in the future. For this reason we must be cautious in using the total fertility rate to infer the possible completed family size of women who are not yet in the childbearing ages.

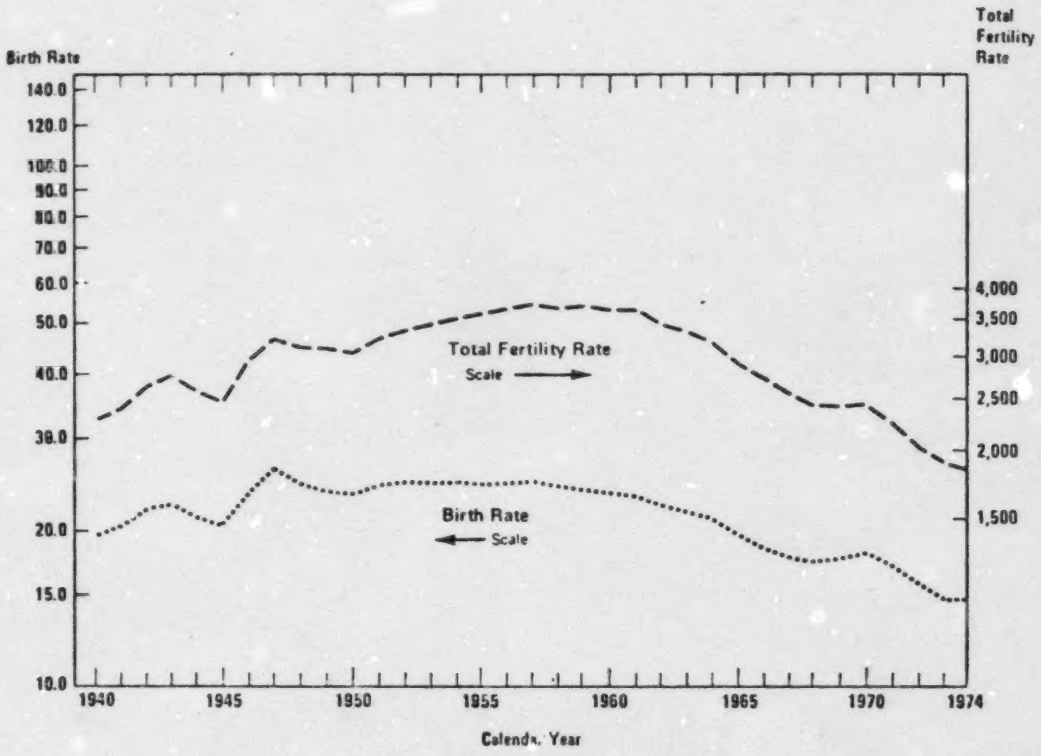
Nevertheless, despite this necessary caution, the total fertility rate affords the most useful gauge of the true level of fertility underlying annual births. As Fig. 1 shows, this rate now stands at its lowest point in U.S. history. As of 1965, the hypothetical "average women" implied by this rate would eventually bear three children over a lifetime. (Averages, of course, blend many different family sizes, ranging from childless couples to those with many children.) By 1974, the average woman would bear less than two. I emphasize "would" because while one can discuss the causes for such gyrations after the fact, we cannot in general predict them.

The uncertainty stems from the fact that people of a given cohort (i.e., year(s) of birth) may well have had quite dissimilar economic and social experiences, which distinguish them from people in other cohorts. Thus, the 1930s Depression, the Second World War, and contemporary disintegration of sex-role stereotypes all constitute distinctive "generational" experiences that may influence fertility behavior and shape family size desires. One generation's childbearing may be an inaccurate guide to another's.

A second source of uncertainty in the projection of annual number of births is the timing pattern, or tempo, of fertility. Two couples may reach the same completed family size by different childbearing schedules. The woman who bears her second or third child at a somewhat later age spreads out her childbearing experience over more years. (Close spacing of births, on the other hand, may affect chances of going on to college in multichild families--a possibility we examine ahead.)

Figure 1

Annual Measures of Fertility: 1940 to 1974




If in a given year many couples decide to postpone having their next child (i.e., "reschedule" their childbearing), fertility will "seem" to decline--and of course the birth rate may drop. The lingering possibility remains that the low rate of fertility recorded in the late 1960s and early 1970s is, in some degree, a lengthy reproductive "pause"--like a musical chorus taking a long deep breath between measures.*

*Recent evidence supporting this possibility is presented in June Sklar and Beth Berkov, "The American Birth Rate: Evidences of a Coming Rise," *Science*, Vol. 189, August 29, 1975, pp. 693-700. Contrary evidence is reported in Harry M. Rosenberg, et al., "U.S. Fertility Trends: What Birth Rates Specific for Age and Parity of Women Tell Us," in *Proceedings of the American Statistical Association, Social Statistics Section, 1976* (in press).

Because one cohort's fertility performance may differ from another's, and because the tempo of future childbearing may change, it is difficult to forecast the annual birth rate with much certainty. The apparent recent decline in the total fertility rate could always be an artifact of some past cohort; or it could be concealing some sizable element of postponed fertility. Until women reach the end of their childbearing years, the possibility will remain that a surprising number of today's young couples with two children may decided to add a third. The possibility may seem remote, but the erratic record of past forecasts makes it unwise to rule out such surprises.

The fact that precise projections of population growth and structure are made should not obscure the uncertainty which surrounds the necessary assumptions about future childspacing and completed family size. These assumptions have a limited life expectancy, and the judgments on which they rest must be reexamined continually in light of several considerations.

First, it is generally agreed that a considerable change in fertility norms and desired family size has occurred in recent years. Although the desires and expectations that families express give only the shadow of the future, not its shape, they are nonetheless possible forerunners of change. Surveys in recent years reflect a continuing decline in the number of children that young wives 18 to 24 expect to have: 3.1 in 1960, 2.9 in 1967, 2.4 in 1971, and 2.2 in 1974. (For blacks, the corresponding decline was from 2.6 in 1971 to 2.2 in 1974.)* This decline is of particular interest since other studies have shown a close connection, on average, between such stated expectations and eventual outcomes. It seems clear that fertility norms have undergone a major shift downward, at least for a portion of the population.**

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*U.S. Bureau of the Census, *Current Population Reports*, Series P-20, No. 277, "Fertility Expectations of American Women: June 1974," February 1975.

**There is some basis for caution, however, in interpreting current observed behavior as being due to normative changes. Judith Blake contends that recent birth expectations may have been influenced, on a short-term and relatively superficial basis, by intense public attention to population problems. She points out that the recent record-low birth expectations are incongruent with other American reproductive attitudes, including a tolerance for the large family and an aversion to childlessness and the one-child family. "The lack of congruence in American reproductive attitudes at present," she concludes, "suggests that some conservatism might

Second, increasing numbers of couples are now well protected from the risk of unintentional conception. Reliable and unobtrusive methods of contraception have come into wide use and will spread even wider as education and awareness rise. The number of couples using one of the three most effective contraceptive methods--sterilization, the pill, or the IUD--rose from 37 percent in 1965 to 58 percent in 1970. Today the figure undoubtedly is higher, and the easier availability of legal abortion as a backup method affords virtually complete control of fertility.

Third, the evidence is unmistakable that fertility decisions have become more rationalized, and increasing numbers of women are making choices rather than conforming to a socially imposed role. In earlier years, if married women worked outside their homes, they tended to do so only intermittently and usually withdrew from the labor force to raise their families. Married women now go to work early in their adult lives. The sharpest increase in working wives since 1960 has been in the under-25 group. Young women today are far more likely to work and to avoid interrupting their careers to bear children.*

In sum, women today seem to *want* smaller families than before; couples are increasingly *able* to realize their desires; and each woman appears to

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be wise in accepting current birth expectations as valid indicators of the long-run intentions of youthful cohorts." Judith Blake, "Can We Believe Recent Data on Birth Expectations in the United States?" *Demography*, Vol. 11, No. 1 (February 1974), pp. 25-44. For further evidence and discussion of Blake's argument, see separate comments by Larry Bumpass and David L. Kruegel in *Demography*, Vol. 12, No. 1 (February 1975), pp. 155-156 and pp. 157-161. The case by Bumpass is given in greater detail in "Is Low Fertility Here to Stay?" *Family Planning Perspectives*, Vol. 5 (1973), pp. 67-69.

*Between 1961 and 1973, the labor force participation rate of married women increased from 32.7 to 42.2 per 100 women in the general population. For married women under 25, however, the corresponding increase was from 31.5 to 51.0; and for those under 25 with young children (under 3), from 17.2 to 32.0. Source: *Metropolitan Life Statistical Bulletin*, August 1974.

A thorough recent analysis of these shifts is "The Changing Economic Role of Women," Chapter 3 in the *1975 Manpower Report of the President* (Washington: U.S. Government Printing Office, 1975).

be *choosing* more freely than ever before those productive activities she finds most fulfilling. There is room for a variety of views about what these "soft" trends add up to, depending largely on how one interprets them and what one sees as their future implications. I am reasonably confident in drawing several conclusions.

One conclusion is that *fertility is likelier to decline further than to return to levels as high as those of the late 1950s.* However, period-based (as opposed to cohort-based) fertility measures may show short-term increases or declines.

Another conclusion is that *the desired size of a family (for those who have one) will converge on the two-child family as a national mode.* Couples wanting large families (4 or more children) will become rare.

Finally, we have probably entered upon an *era of frequent and pronounced fluctuations in the annual birth rate engendered by national economic conditions.* In responding to changes in these conditions, future parents will exercise more effective control over whether and when to have children.

One implication for the educational sector is clear enough: if the size of future birth cohorts is apt to fluctuate--and unpredictably--our demographic radar needs to be all the sharper. For planning purposes, assumptions about fertility should not simply be chosen and forgotten. It is crucial to judge their validity against current indices as they become available, including annual data on fertility expectations of American women, labor force participation by young women, and other series that may foreshadow new trends.

AGE STRUCTURE: CONTEMPORARY PATTERNS AND FORTHCOMING CHANGES

Predicting fertility trends is a tricky business in which one risks playing the fool for posterity. For that reason, demographers have evolved a shrewd procedure for dealing with questions about the future. They prepare a set of "illustrative projections"--conditional forecasts based on stated assumptions for which they deny responsibility--and then invite you to take your pick. The "official" menu of alternative projections are those issued periodically by the Bureau of the Census, and the Bureau has released its newest set this year.

Projection Series I, II, and III provide a reasonable range of assumptions one might want to make about the course of future fertility. (Their assumptions about mortality and net immigration are identical.) Nevertheless, I hasten to add that no one series is likely to depict the future course of fertility for an extended period. Even were one of the assumptions about completed cohort fertility (i.e., the average number of lifetime births per 1000 women) to prove essentially correct, the trend in annual births could differ greatly from that projected because of changes in the tempo of childbearing.

Series II is for now the most reasonable projection in light of current birth expectations data. It assumes an ultimate completed cohort fertility rate of 2.1 births per woman.* The ultimate completed cohort fertility rates for Series I (2.7 births per woman) and Series III (1.7 births per woman) were set so as to have a one-child range.

Although these projections cannot reduce our uncertainty about future fertility levels, they can serve several useful purposes. Foremost among them is to show impending changes in the age structure of the

*In 1974, as noted earlier, wives 18 to 24 years old expected an average of 2.2 lifetime births. When adjusted to include those women who have not yet married or who will remain single, the birth expectations data suggest that as of this time the average lifetime fertility of all women 18 to 24 will be about 2.0 births.

population that is already born, a matter of primary concern to educational planners. Certain of these changes are all but inevitable, for they appear in all three projection series (although with varying degrees of intensity).

The term "peristalsis"--the spasmodic process by which a python swallows a pig--is an apt metaphor for how the United States is absorbing the baby boom and bust. The most apparent feature of the population's age distribution today is the baby-boom bulge moving through successive age boundaries (refer to Fig. 2). The bumper crop of babies after WW II crowded the schools during the next decade, and became job-seekers in the next. From birth to maturity, they have exerted their pressure on the capacity of maternity wards, then schools, and then the job market.

Two features of today's age distribution spell trouble in the years ahead. First is the bulge between ages 10 and 28, which represents the baby boom as of 1975. In recent years, the leading edge of this wave--persons now in their late twenties--has spilled out of the colleges and universities and flooded the labor market. The bulk of the wave--the large cohorts born during the mid-1950s and early 1960s-- is still in school, however.

Second, notice that today's distribution is pinched in at the bottom. This dent is the baby bust--the relative dearth of children under about 10 years of age. As American fertility plummeted in recent years, it carved a notch in the population's age profile. For every hundred children under five in 1965, there are now only about 78. This notch, then, is the first step in the slowing down of growth.

If fertility continues at its present low level, the notch will extend downward as time passes, forming a broad neck under the pyramid. If it declines further, the notch will not only extend downward, it will also

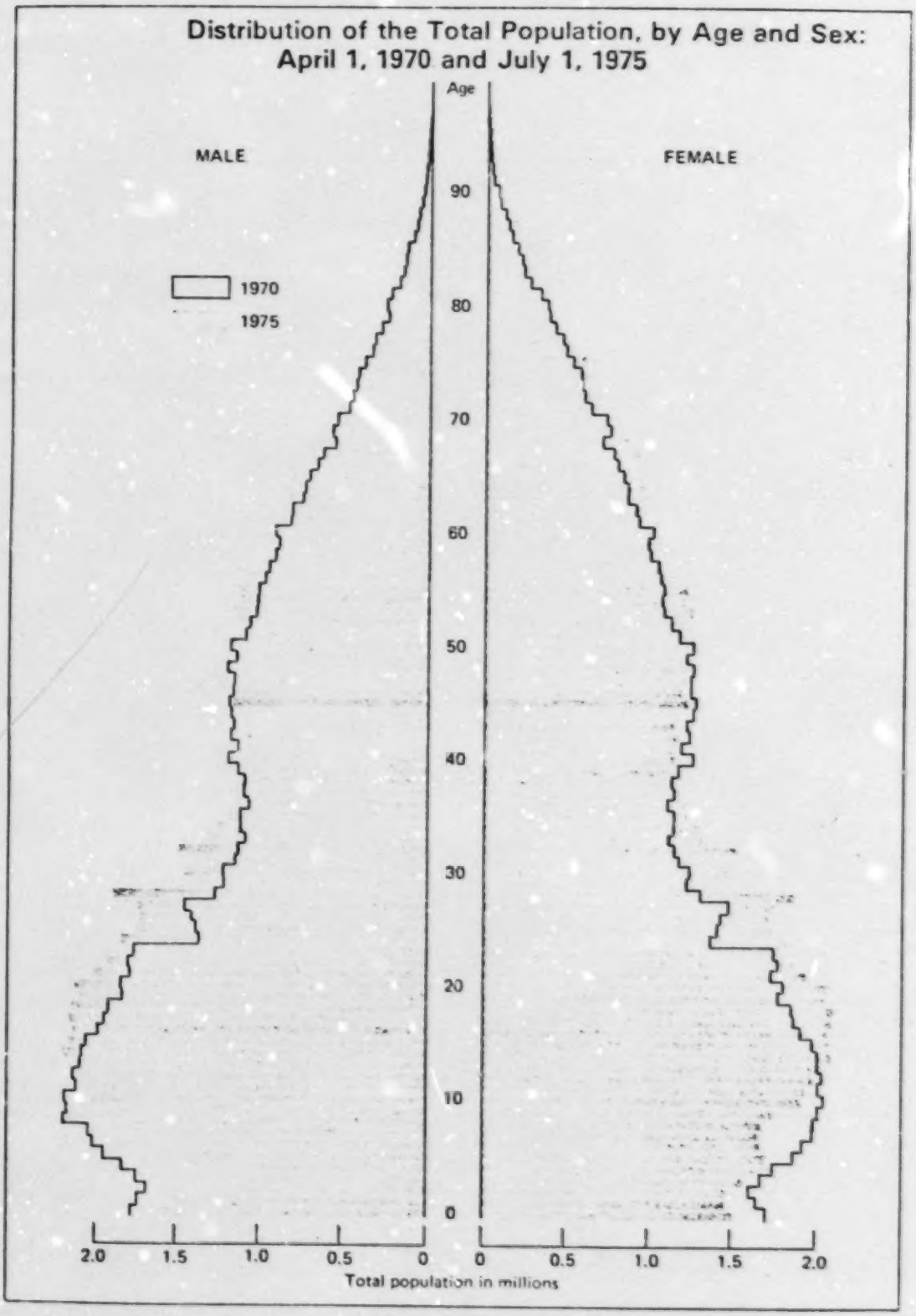
Distribution of the Total Population, by Age and Sex:
April 1, 1970 and July 1, 1975
Age
MALE
FEMALE
1970
1975
90
80
70
60
50
40
30
20
10
0
2.0
1.5
1.0
0.5
0
0
0.5
1.0
1.5
2.0
Total population in millions

Figure 2

cut deeper, giving the age distribution more of a lightbulb shape. The more abrupt the slowdown, the deeper the notch will cut into the age distribution. Even now, a severe imbalance impends: an era of a decade or more during which different parts of the age distribution will be out of phase. The reason is that a span of 20 to 25 years--about one generation--will separate the outcropping of the baby boom and the dent of the baby bust.

This broad demographic imbalance will manifest itself in several ways of particular interest to educational planners. To examine these in closer detail, Fig. 3 presents data on the projected size of several functional age groups that correspond to social roles or role-changes relevant to the educational sector:

- Elementary and secondary students (age 5-13; age 14-17)
- College students (age 18-21)
- Persons initially entering elementary and secondary school-teaching (age 22)
- Candidates for mid-life career redirection (age 35-54)

Note that while Series II is the "best guess" projection for now, Series I and III correspond to possibly higher and lower fertility levels, respectively--levels which few demographers regard as entirely implausible.

Each of the age groups shown in Fig. 3 is projected to fluctuate noticeably under Series II assumptions, and in both of the other projections the fluctuations tend to be more intense, sometimes dramatically so. (All three series coincide for the over-20 age groups, who are already born.) The projections show that the successively smaller birth cohorts in recent years will appear as a shrinking number of children 5-13 years old between now and 1980, and of young adults 18-21 years old during the mid-1980s, sustaining the pressure for schools and colleges to adapt to lower enrollments. In contrast, middle-aged adults 35-44 years old are scheduled to undergo a dramatic increase during the projection period, foreshadowing a potential job promotion squeeze and a

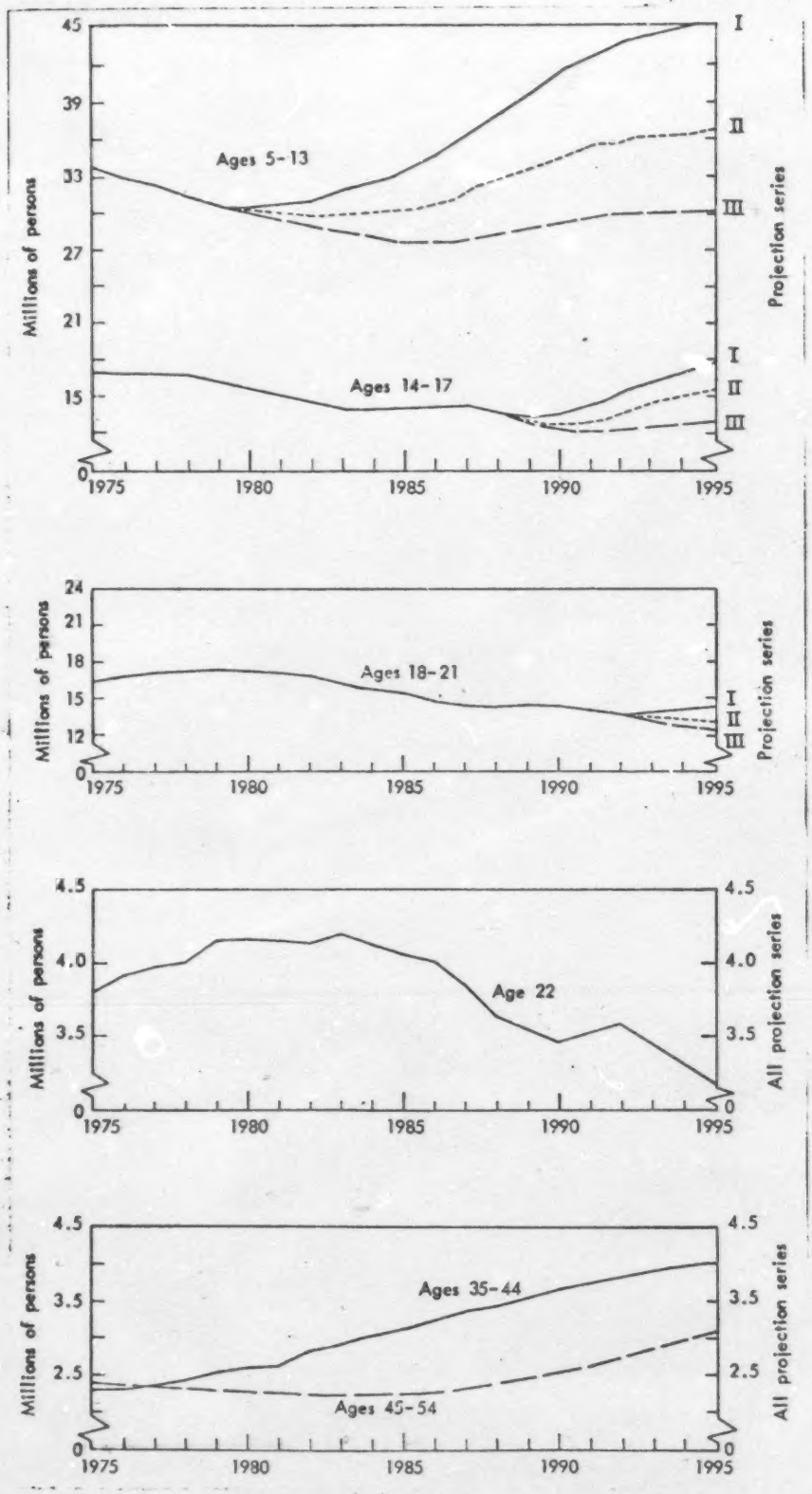
Millions of persons
Ages 5-13
Ages 14-17
Projection series
I
II
III
Ages 18-21
Age 22
All projection series
Ages 35-44
Ages 45-54
1975
1980
1985
1990
1995

Figure 3

trend toward redirection of careers. Some of these fluctuations are likely to produce perverse interactions between age groups. For example, as the number of children 5-13 begins to increase in the mid-1980s, the number of persons turning 22--their potential teachers--begins to decline.

Although the future demographic context within which educational policy will be formulated contains some imponderables, certain things are clear from the data displayed in Fig. 3. Fluctuating fertility patterns in the future imply that many major institutions which are highly age specific in function--from the maternity ward, through the schools, to the social security system--will continue to find themselves alternately overequipped and underequipped.

## III. INTERACTIONS BETWEEN DEMOGRAPHIC TRENDS AND EDUCATION SECTOR TRENDS

In this section, I examine several areas in which demographic changes may impinge on the education sector. The first concerns long-term adaptation within the labor market for school teachers which, in conjunction with several foreseeable demographic shifts, may give rise to a teacher shortage sometime in the 1980s. The second concerns the possible imminence of a future "promotion squeeze" in the labor market and a consequent trend toward mid-life career switching, which could intensify the future demand for career-oriented adult education. Finally, I consider the possible depressant influence on college attendance of a "sibling squeeze"--a rising incidence of families that have several children within the college ages at the same time--as a result of closely spaced births in the 1950s.

### LONG-TERM ADAPTATION WITHIN THE LABOR MARKET FOR SCHOOL TEACHERS

A couple's decisions about childbearing and spacing critically influence the wife's subsequent life by affecting her entry into and withdrawal from the labor force. And owing to continuing sharp growth in the labor-force participation of women of childbearing age, those decisions will be important to an ever larger fraction of U.S. women.

Childbearing and career possibilities are elaborately and complexly intertwined, however, particularly in labor markets where the demand for workers is, itself, affected by fertility patterns. These problems are nowhere more apparent than in the largest, and for women the most important, professional labor market in the United States, the market for elementary and secondary school teachers.

There was a serious shortage of teachers in the 1950s and early 1960s, due largely to the postwar baby boom. The shortage was all the worse because large numbers of women withdrew from the profession to bear

children, confident they would have no trouble reentering. They were wrong. The demand for teachers was so strong that new college graduates prepared to teach flooded the market in the late 1960s; and to make matters worse, the growth rate in elementary and secondary enrollments slowed down. By the late 1960s, there was a substantial teacher surplus.

The effects of those fertility decisions--of women in general and teachers in particular--still linger. In fact, there are signs that the pattern may repeat itself, only this time in reverse. The proportion of college entrants aspiring to a career in teaching has shrunk every year since the onset of the teacher surplus. And many of the young women qualified to teach may well base their childbearing decisions on the assumption that teaching jobs will remain scarce in the future. And yet, ironically, the interplay of those pessimistic decisions and of several forthcoming and predictable demographic shifts might give rise to a teacher *shortage* sometime in the 1980s.

The possibility of a teacher shortage is premised on the foreseeable interplay of several demographic shifts with adaptive behavior on the supply side of the market.* In highly simplified form, here is what may happen, starting with the current situation:

1. The recent and well-publicized drop in the fertility rate has already caused a drop in school enrollment and thereby contributed to the current teacher surplus.

2. Seeing already-qualified teachers having trouble finding jobs, college students are turning away from the teaching profession. (By 1975, the proportion of entering college freshmen who aspired to careers in elementary or secondary teaching had fallen to one-third the level in 1969--down from 22.1 percent to 6.5 percent.) Thus, rates of production of new teachers, which have declined recently, may fall off even more sharply in the future.

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*I am indebted to my Rand colleague Stephen J. Carroll who developed the logic of this scenario. Detailed evidence is contained in Stephen J. Carroll, *Analysis of the Educational Personnel System: VIII. The Market for Teachers*, The Rand Corporation, R-1344-HEW, February 1974.

3. Even so, the teacher surplus is likely to persist at least into the early 1980s, since the annual output of new teachers will be augmented by the availability of large numbers of persons previously qualified, but not employed, as teachers. These inactive "reserve teachers" during that difficult period will be mature women graduated in the late 1950s and 1960s seeking to reenter teaching as their family responsibilities decline. By continuing to discourage college students from entering teaching as a career, the persisting teacher surplus will thereby lengthen the interval during which the flow of young teachers into the total stock is reduced. And the median age of the national teacher stock will rise.

4. After several years in which the number of new teachers produced falls substantially short of the number of mature teachers who terminate (either by retiring or withdrawing from active status in the reserve pool), the reserve pool itself will drain to a point of equilibrium between supply and demand. That is, the sum of (relatively few) newly produced teachers and (relatively many) reserve teachers will no longer exceed net demand. This balance will be only transitory, however, since it will result from reserves vanishing, with little immediate increase in new production.

Depending on the element of timing, several other demographic forces may deepen or prolong the shortage:

5. By the mid-1980s, the initial large cohorts of teachers produced in the mid-1950s will be reaching advanced ages.* Increasing numbers of active teachers will retire, and persons not actively engaged in teaching are likely to begin withdrawing from the active reserve pool. Both effects will accelerate the contraction of the reserve pool.

6. School enrollments, previously level, will start to rise two to three percent annually in 1985, assuming a continuation of current fertility levels. (This rise in enrollments would accelerate substantially if the fertility rate increased.)

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*For example, 22 percent of all teachers active in 1971 were 50 years or older and are therefore certain to retire by the mid-1980s. An additional 18 percent were 40 through 49, the majority of whom are likely to retire by the end of the 1980s.

7. The number of persons turning 22 years old (roughly the age of entry into teaching) will begin to decline about 4 percent annually starting in 1986 (refer to Fig. 3, p. 13). There will be a pause in this decline between 1989 and 1992, followed by a more precipitous 16-percent decline in the following 3 years (echoing the post-1970 decline in births).

This highly simplified description masks some major uncertainties, the most important of which is whether and to what extent the separate effects would occur at the same time. A shortage may dramatically enlarge career possibilities for middle-aged women teachers.* By that time, many and perhaps most qualified teachers will have been certified prior to the mid-1970s (when the full deterrent effect of the present teacher surplus took hold). The willingness of these middle-aged women to return to a teaching career in a newly advantageous market will be conditioned in part by their previous decisions about child spacing and completed family size--those decisions quite possibly having been made with a far less favorable career outlook in mind.

It is apparent that there is considerable inertia in the supply of teachers. The current level of teacher production depends upon the career choices made by the students who entered college four or more years ago. The size of the reserve pool, given the demand for teachers, depends upon the career choices made by college entrants throughout the past three decades. And its size will change from one year to the next only to the extent that current teacher production differs from the sum of (1) the current change in the total demand for teachers and (2) teacher production roughly 30 years ago. If the proportion of reserve teachers who seek teaching positions is roughly constant, the reserve supply will not be responsive to current market conditions.

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*Males who had formerly taught also would be affected, but to a lesser extent since most of them would have pursued other vocations by then.

Suppose, for example, that the net demand for teachers is roughly constant. The surplus will continue as long as the supply of eligible new graduates plus the reserve supply exceeds the net demand. Even if teacher production rates and, consequently, supplies of eligible new graduates decline sharply, the surplus will persist until the reserve pool is substantially reduced. That will occur only after a series of years in which the number of teachers produced falls substantially below the numbers produced 30 years earlier.

The important point is that this inertia works in the opposite direction as well.* Suppose that the surplus is ended in 1983. The situation in that year will be approximate equality between net demand and the sum of reserve supply and new supply. But that balance will have been achieved through declines in both components of supply. And those declines will continue, at least for a while. The students who entered college in the preceding two or three years will have made curriculum choices during a period of teacher surplus and, presumably, only a small proportion of them will have entered teacher preparatory programs. Thus, the annual numbers of new teachers produced will continue to decline, the reserve pool will contract yet further, and the supply of teachers will be yet smaller. After three or four years, the college students who entered after the end of the surplus will begin to graduate, teacher production will begin to grow, and annual new supplies of teachers will begin to grow. But the reserve pool, and consequently the supply of reserve teachers, will continue to contract until new teacher production climbs to levels greater than the levels of new teacher production 30 years earlier. And since the surplus is not likely to end until teacher production has fallen well below the levels of 30 years earlier, this climb will require some time.

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*Analogous phenomena have been documented for other fields, e.g., engineering, law, and physics. See Richard B. Freeman, *The Labor Market for College-Trained Manpower* (Cambridge: Harvard University Press, 1971); idem, "Legal 'Cobwebs': A Recursive Model of the Market for New Lawyers," *Review of Economics and Statistics*, Vol. 57, No. 2, May 1975, pp. 171-179; "Supply and Salary Adjustments to the Changing Science Manpower Market: Physics, 1948-1973," *American Economic Review*, Vol. LXV, No. 1, March 1975, pp. 27-39.

If and when the surplus ends, then, the inertia in the system could lead to the almost immediate onset of a *substantial and lengthy teacher shortage.*

MID-LIFE CAREER REDIRECTION

People in the middle years of life--roughly 35 to 54--comprise a functional group in society likely to be affected significantly by forthcoming demographic change. That broad stage of the life cycle is significant for several reasons, noted by Pascal.* One is that by 35 most people are established in their careers and probably can foresee roughly what the next 25 years will bring in terms of advancements and satisfaction. The late thirties are also the period when many housewives consider entering or reentering the labor force as their children enter school and other household responsibilities diminish. With lower fertility and equalization of opportunities, the proportion of such housewives doing so will likely increase in coming years.

Pascal also cites people's growing desire to break up and reroute the timeworn grooves down which they have been channelled mechanically through standardized educational and training institutions into permanent jobs. Various indicators of discontent can be pointed to, including discontent with rigid, authoritarian work structures, and with the isolation of education from work and of students from jobholders.

The seeming contemporary dissatisfaction in the work force is hard to interpret and could arise from several factors. There is, to be sure, a life-cycle effect, whereby dissatisfaction typically increases up to age 30,

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*Anthony H. Pascal, *An Evaluation of Policy Related Research on Programs for Mid-Life Career Redirection: Vol. I--Executive Summary*, R-1582/1-NSF, The Rand Corporation, February 1975, pp. 6-7.

falls off, and increases again at midlife (say 45). But there also may be a generational effect, whereby each succeeding cohort of workers sets its sights higher in terms of what it regards as "satisfying." Possibly there is an economic effect; perhaps job satisfaction waxes and wanes with the overall state of the economy and workers' sense of job security.

Whatever the reasons for job dissatisfaction, the phenomenon has been accorded increasing recognition and concern. One answer to the problem is career redirection, by which is meant a full-fledged change of occupation, not merely improvement of existing skills or upgrading of credentials for the same line of work.

As educational policymakers are undoubtedly aware, the broader implications of career redirection have to do with a more dynamic, personally satisfying and adaptive kind of society. This fact, coupled with a foreseeable expansion of the potential clientele for midlife career redirection, make it a topic of particular contemporary interest for those concerned with making education more effective for older adults.

The direct demographic effect can be deduced readily from the data shown earlier in Fig. 3 (p. 13). As the baby-boom cohorts mature, the numbers of persons aged 35 to 44 will gradually swell. The early signs of that effect will soon appear, but the most rapid expansion will occur after 1980. Between 1981 and 1987 alone, the number of 35-to-44-year-olds will increase 28 percent. Altogether, there will be a 43-percent increase from 1977 to 1987. By 1987, the expansive trend will have extended to those 45 to 54. Sheer demographic arithmetic, then, foreshadows increasing numbers of candidates for mid-life career redirection in the years ahead.

But the indirect consequences of imbalance in the future age structure of the labor force may be more critical. Current labor force projections suggest the possible imminence of a "promotion squeeze" in the labor market as the large, well-educated baby-boom generation attempts to move past the lower rung of the occupational ladder.* Of course, such stresses will differ in degree and effect within labor markets, but the overall result

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*1974 Manpower Report of the President* (Washington: Government Printing Office, 1974), pp. 103-113.

could (in favorable economic times) be increasing future rates of mid-life career switching, and increasing demand for career-oriented adult education.

This potential squeeze can be visualized from Fig. 4, which shows how the age structure of the contemporary labor force will have changed by 1990. The ratio of younger workers to senior workers (the latter in general occupying positions to which the former aspire) will increase sharply. In 1972, for example, there were only 98 workers 35 to 44 years old for every 100 workers 45 to 54; by 1985, there will be 142.* It appears that at least some career ladders will become severely congested.

Workers with high levels of education generally expect to advance rapidly in their careers, and understandably may attach great importance to promotional opportunities. If older workers remain ensconced in their jobs because of seniority or the value of their skills and experience, those opportunities will be more limited for the younger cohorts of workers than is now the case.

At present, little is known about the actual process of mid-life career change; even less is known about would-be career redirectors. The most informative recent data, shown in Table 1, make two points clear. First, the *act* of changing careers currently occurs mostly at the youngest adult ages. Adult Americans in their twenties are the most likely to engage in further learning for the purpose of changing careers. Second, the same data suggest that the *desire* for career redirection extends well into mid-life--albeit a desire that people often express but seldom act on. Under favorable economic conditions, which would tend to put career progress ahead of job security in jobholders' minds, growing discontent among older workers and impatience among younger workers stalled at the base of the career ladder could erupt into a prolonged demand on the schools for adult career retraining. In any case, as Ryder contends, this demand would be less a product of demographic imbalance than of institutional arrangements that impede progress (e.g., seniority systems) and of the degree to which women participate in the labor force and seek more rewarding jobs.**

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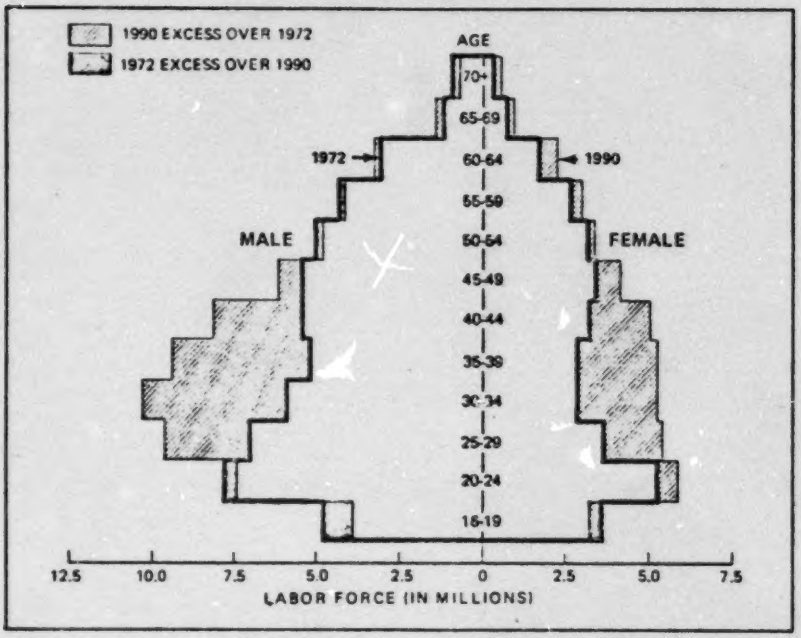
*Calculated from Denis F. Johnston, "The U.S. Labor Force: Projections to 1990," *Special Labor Force Report 156*, U.S. Bureau of Labor Statistics, 1973.

**N. B. Ryder, "Two Cheers for ZPG," *Daedalus*, Vol. 102, No. 4, (Fall 1974), pp. 53-56.

Figure 4

Labor Force by Age and Sex: United States, 1972 and 1990




Source: Denis F. Johnston, 1973, "The U.S. Labor Force: Projections to 1990," Special Labor Force Report 156, U.S. Bureau of Labor Statistics; and U.S. Bureau of Labor Statistics, 1973, Employment and Earnings, Vol. 19, No. 7.

Table 1

ADULT AMERICANS' INVOLVEMENT IN LEARNING FOR THE PURPOSE OF JOB CHANGE, BY AGE GROUP, 1972

| Age Group | Total | Percent Who Are: | | |
|---|---|---|---|---|
| | | Not Involved | Involved | |
| | | | Interested | Engaged |
| 18-24 | 690 | 56 | 30 | 14 |
| 25-29 | 561 | 70 | 24 | 6 |
| 30-34 | 461 | 73 | 24 | 3 |
| 35-44 | 845 | 81 | 17 | 2 |
| 45-54 | 883 | 84 | 12 | 4 |
| 55-60 | 460 | 95 | 4 | 1 |

Source: Anthony H. Pascal, An Evaluation of Policy Related Research on Programs for Mid-Life Career Redirection: Volume I - Executive Summary, R-1582/1-NSF, The Rand Corporation, February 1975, Table 5. (Based on interview data collected by the Western Office of the Educational Testing Service on a stratified and weighted random sample of Americans between 18 and 60 who were not full-time students.

We do not know whether individuals will opt for progress over job security; we do not know for sure how deep worker dissatisfaction actually is; most important, we cannot forecast the economic context in which these factors will come into play. We do know that these possibilities are matters of significant conjecture, and should therefore be early targets of future research.

A "SIBLING SQUEEZE"?

The effect of post-World War II fertility patterns on elementary and secondary school enrollments is clear enough, but their effect on higher education enrollments is a more complicated matter. Since not everyone continues beyond high school, postsecondary enrollments depend not only on the size of a given cohort but also on certain discretionary factors that influence college attendance rates. Cohort size is readily inferred from earlier fertility, but our understanding of the discretionary factors is, at best, imperfect.

So far into this decade, attendance rates have followed a fairly unpredictable course, declining unexpectedly after 1970-71 but then in Fall 1975 rising abruptly above forecasted levels for nearly all segments of higher education. In retrospect, we might have expected enrollment rates to decline for several reasons. One of the factors that fueled enrollment growth during the 1960s--avoidance of the draft for an unpopular war--ceased early in the 1970s. More recently, it has been suggested that from an economic standpoint, the value of an investment in a college degree has diminished.* And inflation (which may shrink enrollments by making the cost of attendance prohibitive) and unemployment (which may either shrink or expand enrollments**) have both intensified sharply during the 1970s.

These depressant influences on college-going behavior are being exacerbated by a fertility-related influence that is little recognized

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*Richard Freeman and J. Herbert Hollomon, "The Declining Value of College Going," *Change*, September 1975, pp. 24 ff.

**High unemployment may discourage college attendance if part-time work is necessary to finance it; or it may encourage attendance because attractive alternatives are lacking.

and whose implications have scarcely been examined. This influence results from the schedule of post-1950 childbearing, which was marked by a high fertility level and closely spaced births. With these cohorts now maturing to college age, that schedule is manifesting itself in a "sibling squeeze"--a rising incidence of families that have several children within the college ages at the same time.* For families of a given size, closely spaced births in the late 1950s now mean that the economic burden of a college education for several children is compressed into a comparatively short span of time.

Imagine a family with three children born in 1955, 1957, and 1959, who entered four-year colleges in 1973, 1975, and 1977. Between 1973 and 1980, the family must meet 12 years' worth of college fees in only eight years, as shown in the following diagram:

| Date | Oldest Child | Middle Child | Youngest Child |
|---|---|---|---|
| 1973 | X | | |
| 1974 | X | | |
| 1975 | X | X | |
| 1976 | X | X | |
| 1977 | | X | X |
| 1978 | | X | X |
| 1979 | | | X |
| 1980 | | | X |

The first double-payment years of 1975 and 1976 are likely to impose an extraordinary drain on the family's resources, and although it may manage with some difficulty, the second double-payment year becomes a crucial point of decision. The middle sibling, half-way through college, intends to continue. But what about the youngest child, a

*David Goldberg and Albert Anderson, *Projections of Population and College Enrollment in Michigan, 1970-2000,* prepared for the Governor's Commission on Higher Education, Lansing, Michigan, July 1974.

prospective freshman? Over the previous two years, savings have dwindled, perhaps faster than had been expected, and the family's economic ability to handle two more double-payment years is very much in doubt. A difficult choice arises: whether to absorb the expense of six more years of college within a four-year period, or to ease the burden by completing the middle sibling's education and cutting back on the youngest. This harbinger of things to come will force at least some families to reconsider the abstract advantages of a college education for the youngest child at a time of concrete economic need. The result may be a shift from a high-tuition private to a low-tuition public institution, from a four-year to a two-year college, or simply less encouragement to attend college at all.

This disturbing fable is almost entirely speculative, of course, since we lack data on how families actually react to the pressures of a sibling squeeze. (It *has* been shown, however, that children in large families receive less encouragement to become educated.*) But for families with second and third children currently reaching college age, there can be no doubt that the pressures are real and will intensify during the remainder of this decade: (1) Children at or nearing college age are more densely spaced within families than they were a decade ago; (2) this demographic compression pattern will persist until the early 1980s; (3) the compression has intensified the most in black and lower-income white families.

The sibling squeeze is illustrated in Fig. 5, which suggests how birth intervals (the length of time between one live birth and the next) have shortened since 1950. (For the sake of simplicity, a birth interval of 24 months or less is used as the standard of comparison.) The top panel shows the percentage of all second births that occurred within 24 months of the first child's birth. Among whites, for example, only

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*Studies of this point are reviewed in *A Review of the Actual and Expected Consequences of Family Size*, Calspan Report No. DP-5333-G-1, prepared for the Center for Population Research, National Institute of Child Health and Human Development, July 31, 1974, DHEW Publication No. NIH 75-779, Chapter 6.

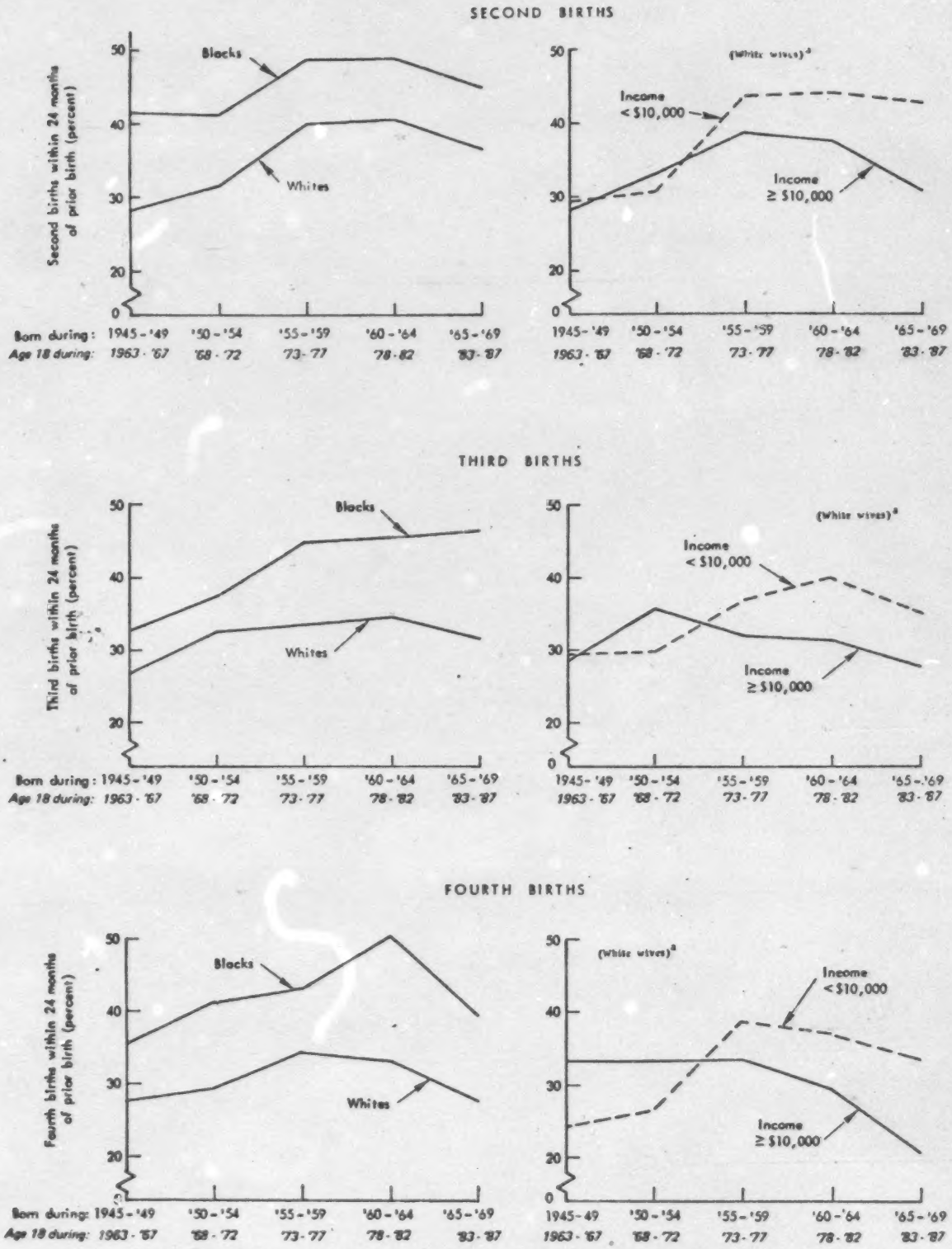
SECOND BIRTHS
Second births within 24 months of prior birth (percent)
Blocks
Whites
Income < $10,000
Income ≥ $10,000
(White wives)a
Born during: 1945-'49 '50-'54 '55-'59 '60-'64 '65-'69
Age 18 during: 1963-'67 '68-'72 '73-'77 '78-'82 '83-'87
THIRD BIRTHS
Third births within 24 months of prior birth (percent)
FOURTH BIRTHS
Fourth births within 24 months of prior birth (percent)

Fig. 5--Changing incidence of short birth intervals, by race and family income

SOURCE: Calculated from U.S. Bureau of the Census, Current Population Reports, Series P-20, No.263, April 1974, Tables 29 and 39.

[a] Childspacing data by family income are available for white wives only.

28 percent of second children born between 1945 and 1949 (who would be prospective college freshman during 1963-1967) were born within 24 months of the older sibling; ten years later, this figure had climbed to 40 percent (for those who would be prospective freshmen during 1973-1977). The percentages for blacks parallel those for whites, only at a somewhat higher level.

Focusing on the two income categories shown here, the comparable rise is sharpest for married women with family incomes below $10,000.* Between 1950-1954 and 1955-1959, the percentage of all second births that occurred within 24 months of the first child's birth increased sharply from 31 to 44 for this lower category of income; the corresponding increase was from 33 to 38 percent for the higher category.

These trends are substantially the same for third and fourth births, as shown in the middle and lower panels of Fig. 5. In general, the frequency of short birth intervals rises, most noticeably for black and lower-income white families.

There is a remote possibility that the sibling squeeze is a mirage,** but it is more likely that this subtle demographic influence has crept up unannounced, giving rise to certain vulnerabilities for children of larger families. It may be detectable only in aggregate patterns of their college attendance. If that is so, the sibling squeeze surely worsens preexisting inequities associated with race and income, and its influence will persist until the early 1980s, by which time the children born after 1965 (who are separated from their siblings by somewhat longer birth intervals) will start reaching college age. If the sibling squeeze has the effect over a decade or more of deterring college attendance

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*Limited to white wives, the only group for whom childspacing data by family income are available.

**The data shown in Fig. 6 cannot prove the existence of a sibling squeeze conclusively. It is possible that families with three or more children synchronized their childspacing so as to avoid a squeeze (e.g., they may have planned for a short interval between first and second births, and a long interval between second and third births or vice versa). I am unaware of any evidence of such higher-order rationality.

on grounds other than ability, the cumulative loss to society in terms of unrealized talent might be substantial. Research to answer these questions has not yet been conducted; when it is, the findings are likely to have clear implications for improving the design of eligibility requirements for student loan and other programs that help finance higher education.

## V. CONCLUSIONS

Population issues lack the single frightening event--war, riot, natural disaster--that galvanizes attention and public action. Slow to develop, they are also diffused and long-lived. Like a glacier, demographic change proceeds slowly and on a massive scale. Its pressures mount steadily but may go unnoticed until the impact of a maturing trend suddenly becomes evident in numerous places nationwide. At that point, the sheer scale of the issue tends to divert "the system" from effective action.

Educational planning often proceeds in ignorance of what is already known about the consequences of population shifts. Demographic analysis can give timely notice of circumstances built into the population's structure for which ameliorative action is possible. Symptomatic of this gap between policy and knowledge were the frenetic responses in the education sector to baby boom and, recently, bust. Throughout the late 1960s and early 1970s, teachers and professors were trained in increasing numbers, despite warnings as early as 1965 of an impending oversupply.* Today there are scarcely enough people around to be educated for all those who are prepared to teach them.

Where do we stand now? Patterns of fertility and population redistribution will continue to change, sometimes sharply, into the foreseeable future. Sizeable fluctuations of elementary, high school, and college populations, in particular, are in prospect during the remainder of this century, along with shifts in the local demand for schooling in urban, suburban, and exurban areas. Meanwhile, the current slowdown in teacher preparation may lead to a shift from oversupply to undersupply of teachers sometime in the 1980s.

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*Allan M. Cartter, "The Supply and Demand of College Teachers," in *American Statistical Association Social Statistics Proceedings* (Washington: American Statistical Association, 1965) pp. 70-80; idem, "Scientific Manpower for 1970-1985," *Science*, Vol. 172, No. 3979 (April 1971), pp. 132-140.

The discontinuity here between policy and knowledge stems from deficient procedures for identifying necessary choices--and for making them. The education sector's adaptation to demographic change necessarily entails difficult choices of emphasis between often conflicting objectives. These choices are inherently political because they result in uneven distribution of costs and benefits among groups of people and jurisdictions. When enrollments decline, for example, education planners must decide whether to reduce teaching staff or increase teacher-pupil ratios, whether to close some schools for economy or keep them open for convenience to the community, whether to submit to decline or seek new ways to use school facilities and faculties such as in adult career redirection and earlier childhood education. They may even wish to consider radical innovations such as performance contracting and education voucher systems.

Technical analysis can identify choices and evaluate the consequences of each one, but it cannot presume to make the final choices because those are matters of value, not technical solution. The education sector can, however, improve the basis for making choices by strengthening its ties to analysis, and especially to demographic analysis. It must insist, however, on having continuously updated information about population trends and projections rather than relying on an occasional "major" forecast.